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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/056,736	01/24/2002	Tom Klitsner	SD6053-US2	1172

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EXAMINER	
KALAFUT, STEPHEN J	

ART UNIT	PAPER NUMBER
1745	

DATE MAILED: 03/24/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/056,736	KLITSNER ET AL.	
	Examiner	Art Unit	
	Stephen J. Kalafut	1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-95* is/are pending in the application.

4a) Of the above claim(s) *78-95* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-16,18,29-40,50,52-54,58-67 and 73-76* is/are rejected.

7)☒ Claim(s) *17,19-28,41-49,51,55-57 and 68-72* is/are objected to.

8)☒ Claim(s) *1-95* are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *6/25/2002*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Applicant's election with traverse of claim 1-76 in Paper No. 1/2/2004 is acknowledged. The traversal is on the ground(s) that "will likely need to search the other groups, particularly group VII". This is not found persuasive because groups II through VI recite various method steps which do not have to be disclosed by the prior in order to anticipate the subject matter of claims 1-76, or have method steps which create products distinct from those of claims 1-76. For example, the product of the lithography method of claims 85-89 does not have to be a fuel cell.

The requirement is still deemed proper and is therefore made FINAL.

Claims 77-95 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to nonelected inventions, there being no allowable generic or linking claim.

Claim 61 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. The recitation that the "porous film comprises pores" would be redundant. Anything porous by definition comprises pores.

Claims 3, 4, 8, 9, 18 and 66 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 3 and 4 are confusing because they recite O_2 to be a "fuel", when this gas is normally an "oxidant". Claim 8 contains the trademark/trade name "Nafion". Where a trademark or trade name is used in a claim as a limitation to identify or

describe a particular material or product, the claim does not comply with the requirements of 35 U.S.C. 112, second paragraph. See *Ex parte Simpson*, 218 USPQ 1020 (Bd. App. 1982). The claim scope is uncertain since the trademark or trade name cannot be used properly to identify any particular material or product. A trademark or trade name is used to identify a source of goods, and not the goods themselves. Thus, a trademark or trade name does not identify or describe the goods associated with the trademark or trade name. In the present case, the trademark/trade name is used to identify/describe a polymer electrolyte and, accordingly, the identification/ description is indefinite. Claim 9 depends from claim 8 and would likewise be indefinite. There is no antecedent for "said thin film membrane" claim 18 or its parent claim 1. Should claim 18 depend on claim 17? Claim 66 would be inconsistent with claim 65, which recites two units according to claim 1. Because claim 1 recites a porous film, both units recited in claim 65 must have a porous film. Requiring one not to have this film would be inconsistent.

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, 6, 11, 12, 15, 31, 39, 40, 61, 63, 64 and 74 are rejected under 35 U.S.C. 102(b) as being anticipated by Rohr *et al.* (US 5,192,334).

Rohr *et al.* disclose a fuel cell (1) comprising a dielectric ceramic substrate (2) having channels (3, 11) extending from its upper surface to its lower surface, and a film-shaped electrode (6), which is a cathode, on the upper surface of the substrate, via a nickel supporting layer (9). A glass rim (15) separates the cathode (6) from the gas which contacts the anode (8). This would imply that the electrode (6) is porous, since there would be no danger from the mixing of the two gases if it were not porous, and thus impermeable to the gases. See column 3, lines 12-30. Each electrode would be in communication with a source for its respective reactant, including air for the bottom electrode (column 3, lines 2-4). The electrolyte (7) is solid, and may be made of zirconia (column 3, lines 50-51), which is conductive to oxygen ions and operable at temperatures between 100 and 1000 °C. Although not specifically mentioned, the electrodes would each have to include a catalyst, in order for the device to be a true fuel cell. The cell is flat and would thus comprise a plane. Claim 64 specifies the shapes of the cylinders of claim 63, but does not require that the cell is cylindrical, so it is also anticipated. Regarding claims 39 and 74, recitations of how the fuel cell was made are treated under product-by-process practice, and are thus not given patentable weight, unless the process is shown to impart a unique structure to the resulting product. See MPEP 2113 and the case law cited therein.

Claims 1-8, 10, 29-31, 34-38, 40, 48, 50, 52, 53, 54, 58, 59-61, 63-65, 67 and 74-76 are rejected under 35 U.S.C. 102(e) as being anticipated by Ohlsen *et al.* (US 6,641,948).

Ohlsen *et al.* disclose a fuel cell comprising a dielectric silicon substrate which includes a porous region produced by anodic etching (column 10, line 66 through column 11, line 24), thus being "etch-processed". An electrode catalyst, made of conductive metals, such as an alloy of Pt

and Ru, may be carried on these pores (column 14, line 57 through column 15, line 19). Thus, the fuel cell includes both a dielectric substrate and a porous electrode film. As seen in figures 6A through 14B, the fuel cell comprises two silicon substrates and electrodes thereon, on either side of a solid electrolyte, as well as gas channels within each substrate, extending from one face to the other, for conducting fuel and air to the respective electrodes. Each substrate is thus associated with a source of the respective reactant gas. The solid electrolyte is Nafion (column 20, lines 45-48). Claims 36-38 recite specific types of non-noble metals or oxide catalysts, but do not require that the catalyst is one of these, and are anticipated along with claims 34 and 35. The fuel cell includes a porous anode on one side and a porous cathode on the other. The multiple cells shown in the same plane would imply that they are connected in parallel. The porous region of the silicon substrate would meet present claim 53, the pores forming part of the gas channels and flow paths. The silicon material surrounding each pore would be a dielectric barrier. Since the electrode is disposed against or on the porous region, the aperture of the channels (pores) would correspond to the surface area of the electrode. The cells include planar shapes, as well as cylindrical rectangular gas passages (figures 11A, 12A, 13A and 14A). Since several cells are coplanar, they would have upper surfaces joined in connected relation. Regarding claim 67, each unit would have both types of electrodes. Regarding claims 10, 52 and 74, recitations of how the fuel cell was made are treated under product-by-process practice, and are thus not given patentable weight, unless the process is shown to impart a unique structure to the resulting product. See MPEP 2113 and the case law cited therein. Because the silicon is rendered porous by anodic etching, and because it forms part of the electrodes, Ohlsen *et al.* disclose a fuel cell with "an etch and anodization processed, porous electrode". Because the

silicon atoms of the substrate are bonded to atoms of hydrogen (column 12, lines 1-18) or oxygen (column 16, lines 10-49), the silicon would be doped.

Claims 1-4, 6-8, 10, 29, 30-40, 50, 52, 60, 61, 63-65, 67 and 74 are rejected under 35 U.S.C. 102(e) as being anticipated by either Neutzler *et al.* (US 6,660,423) or Koripella *et al.* (US 6,387,559).

Neutzler *et al.* disclose a fuel cell (27) comprising a dielectric substrate (14), which may be made of ceramic or silicon (column 3, lines 38-40), and which has channels (32, 36) extending from its upper surface (26) to its lower surface, and a film-shaped anode (18), which includes a carbon backing cloth (19), on the upper surface of the substrate. This cloth would be conductive, since is it made of carbon, and porous, since it must allow the fuel to reach the anode (18). The cell includes a source of methanol fuel (35) for the anode and a source of air (column 4, lines 59-65) for the cathode. The solid electrolyte is Nafion (column 4, lines 46-50). The electrode includes a noble metal such as Pt, Pd or Au, or a non-noble metal such as Ni (column 4, lines 37-46), or alloys thereof. Claims 37 and 38 recite specific types of oxide catalysts, but do not require that the catalyst is an oxide, and are thus anticipated along with claims 34-36. Since the anode sits in a fuel channel (24), the aperture of the channel would correspond to the surface area of the anode. The fuel cells are flat, would thus comprise planes. Claim 64 specifies the shapes of the cylinders of claim 63, but does not require that the cell is cylindrical, so it is also anticipated. Since several cells are coplanar (figure 2), they would have upper surfaces joined in connected relation. Regarding claim 67, each unit would have both types of electrodes. Regarding claims 10, 39, 52 and 74, recitations of how the fuel cell or an electrode

was made are treated under product-by-process practice, and are thus not given patentable weight, unless the process is shown to impart a unique structure to the resulting product. See MPEP 2113 and the case law cited therein.

Koripella *et al.* disclose a fuel cell (12) comprising a dielectric substrate (14), which may be made of ceramic or silicon (column 3, lines 16-24), and which has channels (32) extending from its upper surface (26) to its lower surface, and a film-shaped anode (18), which includes a carbon backing cloth (19), on the upper surface of the substrate. This cloth would be conductive, since is it made of carbon, and porous, since it must allow the fuel to reach the anode (18). The cell includes a source of methanol fuel (35) for the anode and a source of air (column 1, lines 28-31) for the cathode. The solid electrolyte is Nafion (column 4, lines 42-45). The electrode includes a noble metal such as Pt, Pd or Au, or a non-noble metal such as Ni (column 4, lines 37-42), or alloys thereof. Claims 37 and 38 recite specific types of oxide catalysts, but do not require that the catalyst is an oxide, and are thus anticipated along with claims 34-36. Since the anode sits in a fuel channel, the aperture of the channel would correspond to the surface area of the anode. The fuel cells are flat, would thus comprise planes. Claim 64 specifies the shapes of the cylinders of claim 63, but does not require that the cell is cylindrical, so it is also anticipated. Since several cells are coplanar (figure 1), they would have upper surfaces joined in connected relation. Regarding claim 67, each unit would have both types of electrodes. As stated above regarding claims 10, 39, 52 and 74, recitations of how the fuel cell or an electrode was made are treated under product-by-process practice.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 48, 62 and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over either Rohr *et al.*, Ohlsen *et al.*, Neutzler *et al.* or Koripella *et al.*, each cited above.

Claim 48 recites that the individual cells are connected in series, parallel, or both. Because series connections are known to produced increased voltage, while parallel connections increase current, it would be obvious to connect the fuel cells of Rohr *et al.*, Ohlsen *et al.*, Neutzler *et al.* or Koripella *et al.* in any combination of series and parallel connections, to produce the desired electrical output. Claim 62 recites the diameter of the pores within the porous film, which is an electrode. Because pore size would have an effect on surface tension and thus the ability of each reactant to penetrate the electrode, it would be within the skill of the artisan to determine an optimal pore size for the respective electrodes of Rohr *et al.*, Ohlsen *et al.*, Neutzler *et al.* or Koripella *et al.* Claim 73 recites a cooling means for reducing the fuel cell temperature. Since fuel cells are well known to produce heat, it would be obvious to add a cooling means to any of the cells of Rohr *et al.*, Ohlsen *et al.*, Neutzler *et al.* or Koripella *et al.*

Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Rohr *et al.* in view of Fasano *et al.* (US 6,051,329).

Rohr *et al.* do not disclose refractory metals such as Pt, Ru, or an alloy of these, as electrode materials. Fasano *et al.* teach the use of Pt, Ru, and mixtures thereof, as superior electrode catalysts for solid oxide fuel cells (column 4, lines 33-36). Because this is the same type of cell as disclosed by Rohr *et al.*, the catalysts of Fasano *et al.* would be appropriate thereto. For this reason, and because Fasano *et al.* teach them to be superior, it would be obvious to use the catalysts of Fasano *et al.* in the electrodes of Rohr *et al.*

Claims 17, 19-28, 41-49, 51, 55-57 and 68-72 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The prior art applied above, or cited either below or by applicants, does not disclose a fuel cell having the structure recited in claim 1, and which also has either a silicon-based thin film membrane, electrodes having different surface areas, an electrode with a width of between 10 and 200 microns, interdigitated electrodes, spiral or serpentine electrodes, a silicon nitride substrate, conductive coatings on alternating dielectric barriers, such barriers having a width between 10 and 50 microns, ohmic contacts on the bottom surface of the dielectric substrate, or micro-switching devices.

Claim 9 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims. The cell with the structure of claim 8, and also having a moisture cap, is not disclosed by the prior art. Claims 18 and 66 are do indefinite as to preclude determining their patentability under §102 and §103.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Pratt *et al.* (US 6,127,058) discloses an array of co-planar fuel cells. Badding *et al.* (US 6551735) and Rohr (US 5,171,646) disclose fuel cells with tubular gas channels.

The disclosure is objected to because of the following informalities: There is no Figure 1 (i.e., without a letter), as stated on page 11, line 22. Instead, there are Figures 1a and 1b. Appropriate correction is required.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Stephen J. Kalafut whose telephone number is 571-272-1286. The examiner can normally be reached on Mon-Fri 8:00 am-4:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on 571-272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

sjk

STEPHEN KALAFUT
PRIMARY EXAMINER
GROUP 1700